Chapter 8

The Nerd in NRDL

The name, United States Naval Radiological Defense Laboratory, was quite a mouthful. Naval communications shortened that to Navradeflab but to others we were simply the initials, NRDL. Inside the lab, this was pronounced as in *girdle*, so it sounded like nerd-ull! And most of the people in the Scientific Division were indeed nerds of various kinds. The head nerd was Dr.William H Sullivan, the Scientific Director. He was proud of the fact that there was no period after his middle initial. H was his middle name and his associates called him, "aitch." Sullivan came to the lab from Oak Ridge, which was now a facility operated by the Atomic Energy Commission. During the war, Oak Ridge produced fissionable material as part of the Manhattan Project.

His main interest was work on an improved version of the Periodic Table of the Elements. You are, of course, familiar with the Periodic Table. If not, bring it up on your computerized encyclopedia. It started with Dmitri Mendeleev, a Russian chemist, who, in 1869, arranged all the known chemical elements in the order of increasing atomic weights.

Wait a minute! How can you weigh an atom? It's so small that no one has ever seen one even with an electron microscope. The answer is that one can't. What chemists did was take advantage of Avogadro's Law, which an Italian physicist of that name discovered. The law says that equal volumes of different gases contain the same number of molecules under identical conditions of temperature and pressure. So scientists weighed identical bottles of, say, helium and oxygen and determined the ratio of weights. Oxygen was chosen as the standard and given a weight of 16. All the other elements were then ordered by comparing their weight to that of oxygen.

Mendeleev claimed he found a periodicity in that each element resembled the eighth one following it in properties and appearance. His table had many gaps but as more elements were identified the periodicity remained. More accurate measurements and changing the criterion from atomic weight to atomic number made the table very useful in predicting undiscovered elements and in the development of theories on why the periodicity existed. Anyway, H Sullivan thought he had discovered a wholly new kind of periodicity among the elements involving radioactivity and isotopes. Instead of a table with squares for each element, his chart had hexagons so that one could not only look across the rows and down the columns but also along the diagonals. It was explained to me once but I no longer remember the details. It never showed up in the encyclopedia so I guess his theories didn't pan out.

H Sullivan's infatuation with the Periodic Table did have a positive outcome: he left me alone, which was what I needed at the time. I found a small group of engineers and craftsmen waiting for me when I arrived. The man in charge was John Howell. Johnny was an engineer of many talents. I came to depend on his abilities more than anyone else

in the Engineering Applications Section. He had several metal craftsmen in his crew—Noah Vella, an older man who refused to drive a vehicle, having killed a jay-walker who had darted out from between parked cars some time before, and one named Nuckolls, and one named Fingers—who could put together from rough sketches experimental equipment that always worked.

We also had the *Independence*, the aircraft carrier towed back from the Bikini tests, which was docked at a quay removed from the bustle of the shipyard. She had been contaminated by the fallout from the underwater shot. There were big yellow and black radiation placards on the quay and nobody but my people went near it. Actually, the radiation hazard on the *Independence* was now quite low. It was more than two and a half years since the contaminating event. Since we reentered Bikini lagoon some seven hours after the event, radiological decay had reduced the intensity of the radiation on the ship by a factor of 10,000. Nonetheless, we wore film badges to record the radiation exposure, such as it was. And, shipyard workers shunned the area.

A Tour of NRDLand

Initially, we surveyed the ship with radiation meters and submitted paint and rust samples from the hottest spots to the Chemistry Branch for analysis. The Chemistry Branch was the largest of the four branches that comprised the Scientific Division. It was headed by Dr. Claud Schwob, short, middle-aged, and good-natured. He always seemed to have time to explain to me what his group was trying to do. These were modern-day chemists: classical chemists, physical chemists, radiation chemists. They were tracking the myriad fission products that ended up in the fallout, determining what compounds they formed and what decay products resulted. Years later, this work gave us important insights into the nature of the radiological hazards of nuclear war. The chemistry labs had all the glassware and retorts you would imagine plus glove boxes and shielded walls for working with radioactivity. Glove boxes were just that: airtight boxes with viewing ports and gloves inside attached to holes through which the experimenter could handle vials and turn stopcocks while separated from the interior.

A second branch in the Scientific Division was the Physics Branch, headed by Dr. Richard I. Condit. Under Rick Condit were both classical physicists and nuclear physicists. The classicists were concerned with high pressures and temperatures produced by explosions and the damage and incendiary consequences in various environments exposed to them. The nuclear physicists probed within the atom to explain and predict the various nuclear interactions that might be important in radiological defense. A part of the Physics Branch when I arrived was the Instruments Section, headed by Neal Marshall. The need for instruments to measure the insidious radiations from fallout was very great in the first few years of the Nuclear Age. There were three kinds of radiation: alpha, beta, and gamma. The available instruments were generally pieces of laboratory equipment, hardly suitable for field use. Thus, developing rugged reliable instruments—radiacs, the Navy called them—was a high priority. Meanwhile, we wore film badges to measure total exposure and used clumsy instruments that counted the number of ionizing events that occurred in a small closed tube.

A third unit in the Scientific Division was the Biomedical Branch. It was headed by Dr. Ed Alpen, a biologist and medical doctor. The scientists in this part of the Lab were trying to understand radiation injury and trying to find protective agents against radiation injury. Experimentally, they were using rats as a stand-in for humans. These weren't ordinary rats. To minimize variability in experimental results, the branch had developed a colony of genetically similar animals called Sprague-Dawley rats. It was generally recognized that gamma radiation knocked off electrons from various compounds as it passed through the body forming oxidized "free radicals," which then caused the injury. Accordingly, the biologists were testing various anti-oxidants in the hopes of finding a useful protective agent.

I remember one set of experiments involving Vitamin E. There was a control group of rats that received neither treatment nor radiation. There was a larger group that received no treatment and were subjected to several levels of radiation. Finally, there was a third group that received Vitamin E before being subjected to various levels of radiation. Vitamin E, it turned out, did not offer significant protection but what impressed me was that the group of rats that received Vitamin E but little or no radiation outlived the control group by quite a bit. I started taking 400 units of Vitamin E every day in 1950 and have continued to the present. At 85, my hair is just starting to turn gray in the sideburns. My father and grandfathers were gray in their 50s.

There was another group at the Lab not part of the Bio-medical Branch but closely related to it. This was the "rad-safe" organization. Later, these people called themselves "health physicists." Their job was to see to it that the rest of the Lab personnel were not exposed to more radiation than permitted by the regulations of what was then called the Atomic Energy Commission. They monitored the various areas where radioactivity was being used and their approval was required of proposed new experiments with radioactivity. Albert Baietti was the head of the rad-safe group. Known as Big Al, he was a huge individual: about 7 feet tall and close to 300 pounds. Big Al also had a huge stentorian voice and used it, along with his bigness, to shout down and cow the nerds who were trying to learn something about radiation experimentally.

Sooner or later, of course, I had to go toe-to-toe with Big Al in defense of our proposed engineering experiments on the *Independence*. I don't recall now what the confrontation was all about or even who won the argument. It apparently made quite an impression on my staff because when I came to my office the next day I found a poem, neatly typed, lying on my desk. It is carefully preserved among my mementos:

THE PHENOMENOLOGY OF A BAIETTI BLAST

Upon the pontic crossing, strong and brave,
Stood Jerry, watching great Baietti rave
And storm before the portal that he held
'Gainst Al's suggestion that his ideas smelled.
On every side, great heaps of rubble lay.
With thund'rous roars, Al made more buildings sway
And crash. His voice's resonance
Was all he used for ordnance.
One could not say that Jerry sinned
Because he bent before **that** wind —
Bent, but did not break or quail,
Though other men were known to pale
Before the onslaught of the ogre's voice;
And others still, think death a better choice
Than ten brief minutes in Al's heat and blast.
(By atom bomb alone is it surpassed . . .
But A-bombs' heat and blast soon pass away,
While Al can keep his up for half a day!
The wonder is that men don't figger
To use Al for the H-Bomb trigger.)

I guess that's enough said. Some NRDL nerd was obviously familiar with "Horatius at the Bridge!"

My group, Engineering Applications, was only a section and I was only a P-5. Branch heads were P-6's. And Aitch Sullivan, as head of the Scientific Division, was at least a P-7 and maybe a P-8. The branch of which my section was a part was called the Technical Branch when I arrived. There weren't any other sections in the Technical Branch. The job of branch head was vacant. So, I actually reported to Aitch Sullivan. He, of course, was mainly interested in his new theory of radioactive periodicity of the elements. He also was unsure as to how my functions fit into his idea of the mission of the Scientific Division. As a result, I was treated with "benign neglect." For practical purposes, my section was not even part of the Scientific Division. I was able to build a competent engineering organization at the same time I was establishing my contacts in the various scientific branches. Last but not least, I had time to educate myself; to take a crash course in the intricacies of radiological research.

The following spring, June of 1949, I was able to augment my group with a few new college graduates. Two of these, both named Richard, turned out to be pure gold. Dick Soulé was a newly minted physicist from the University of California at Berkeley. He took to the problem of decontamination immediately and soon had devised an experimental chamber on board the *Independence* in which contaminated samples could be washed and scrubbed remotely. Dick Laurino was a UCLA graduate in chemistry who

had a strong analytical bent. He also was a good writer, able to express complex ideas in an understandable way. I soon came to depend very much on these two young men as well as Johnny Howell for the accomplishments of the Engineering Applications Section.

And Then Things Got Serious

Since the essence of my job was to produce usable end products for the Navy, I naturally spent a good deal of time with the military officers who were assigned to the Lab as liaison personnel on behalf of the "sponsors." At first, Jack Fee, the Commanding Officer, represented the Bureau of Ships, the main sponsor of NRDL. Later, another officer was assigned to the liaison function. Other Navy Bureaus started to put money into the Lab, particularly the Bureau of Yards and Docks and the Bureau of Medicine and Surgery. Their liaison officers appeared on the scene. Then things got serious.

On August 29, 1949, nearly a year after I arrived at NRDL, the Soviet Union detonated its own atom bomb. That was a shocker. The high priests of the Manhattan Project, several of which were now members of our Lab, had told us it would take at least a decade for the Russians to build a workable nuclear weapon and maybe they never would. Now, just four years after the end of the war, they had done it.

In retrospect, I am amazed at how quickly our wartime ally, the Soviet Union, became our feared enemy. It seemed no time at all before the Russians were casting vetoes in the fledgling United Nations Security Council and saying *nyet* to the Baruch plan for the international control of nuclear weapons, which only America possessed. The Soviets wanted us to destroy our atomic bombs and declare the world nuclear-free but would brook no inspection of their own nuclear program. The most ominous development, however, was the rapidity with which Stalin enslaved the peoples of Eastern Europe. In 1949, Winston Churchill coined the phrase, *the Iron Curtain*, to describe what was happening in Eastern Europe. So, now that Stalin had the bomb, NRDL became very popular. Atomic defense began to be taken seriously, at least by the military.

The attitude of the nerds and the pace of events at the Lab shifted gears subtly. For one thing, I got a new boss. Yes, the job of head of the Technical Branch was filled within sixty days of the announcement of the Russian bomb test. The new arrival was Dr. Paul C. Tompkins, a physicist. Tompkins was gangly, red-haired, and had a ready smile. He also was not my boss for very long. I should have realized that his arrival had been in the mill for longer than sixty days. The job as head of Technical Branch was merely a stopgap. Shortly, Paul was promoted to a newly created job as deputy to Aitch Sullivan. The position was called Associate Scientific Director. It wasn't clear to me what their respective jobs were but Aitch was rarely to be seen and Paul ran the laboratory. Perhaps Aitch sat in his office and thought deep thoughts about the atomic future.

Another thing that happened was that other branches of the military started projects at the Lab and sent liaison officers to monitor the work. In particular, the Army Corps of Engineers sent a young Lieutenant Colonel named Richard D. Wolfe as its project

officer. Dick Wolfe and his wife, Johnnie, were delightful people and I maintained a warm relationship with them for many years. After a year or two at NRDL, Dick Wolfe was made the deputy and second in command.

Also, military branches that had been supporting work at the laboratory began sending more senior people as project officers. I remember in particular Navy Captain Albert Behnke, Jr., who became project officer for the Bureau of Medicine and Surgery.
Captain Behnke, a big man, was both a physician and a health nut. He lived in a house out on the beach a bit below Seal Rocks. Every morning he would arise at dawn and run across the Coast Highway onto the beach and plunge into the Pacific Ocean. The water in the vicinity of San Francisco is always cold and a source of the endemic fog that often engulfs the city. After his frigid dip, Al Behnke would go to a pile of rocks the size of bowling balls, pick up one in each hand and run a half mile down the beach where he would drop them. He would continue to do this until the whole pile was moved. Then he would return to his house, take a hot shower, breakfast, and go off for a day at NRDL. I never actually saw him do this, you understand, but it was widely known in the Lab so others must have been invited to join him. To the best of my knowledge, that pile of rocks was moved up and down the beach every day for about four years in the early 1950s.

Al Behnke outranked Jack Fee, the commanding officer of the Lab. That caused a mild problem for the Bureau of Ships, the main sponsor, but Commander Fee's tour of duty was over in 1950. His replacement was a Captain Joseph L. Bird. Joe Bird was an austere and remote individual, especially in contrast to the easygoing style of the departing Jack Fee. Part of the reason he struck the nerds as a "cold fish" was his correct assessment that this assignment as CO of NRDL was the end of the road. He would never make flag rank (Admiral). He didn't exactly take out his disappointment on the Lab personnel but he decided that they would know who was in charge.

Joe Bird began to rigorously enforce naval procedures. In particular, every official communication from the Lab; that is, on NRDL letterhead, would be over his signature. That was the rule. Some of the lesser correspondence could be signed by an underling "By direction of the Commanding Officer" but that was that. Aitch Sullivan and most of the rest of the nerds were aghast. They were used to personal correspondence among and with their scientific peers as long as they did not violate security restrictions. Well, they could still do that, of course, but not on official government stationary. If they wanted to take an official position, they had to convince Joe Bird to sign on. There was endless carping about this in the Scientific Division.

In June of 1950, the other shoe dropped, so to speak. North Korea invaded South Korea and what is now known as the Korean War began. North Korea was a client state of the Soviet Union, which now had the atomic bomb. Years later, Herman Kahn would argue that encouraging North Korean strongman Kim Il Sung to invade South Korea was one of the great mistakes made by Joe Stalin. According to Herman, at the time the Truman administration was nearing the end of the process of disbanding the huge war machine built up during World War II. Truman's defense chief, Louis Johnson, was proposing

another series of cuts to the defense budget. Instead, in response to the invasion of South Korea, the defense budget was tripled—and in the following decades the defense appropriation never went back down. Stalin and Kim Il Sung had stopped America from disarming.

Time out for a little bureaucratic explanation. My grade level when I arrived at NRDL was P-5. The "P" in P-5 meant "Professional Series." A graduate engineer with a bachelors degree would enter government service as a P-1, as I did. A new Ph.D. would start as a P-3 or P-4. So, in 1950 I was on the fifth rung of the professional career ladder. There also was a subprofessional career ladder for draftsmen, research assistants, and the like. The beginning salary for an SP-1 was quite a bit less than that for a P-1. In fact, the fifth rung on the SP career ladder, SP-5, had the same salary as a P-1. Another classification was the CAF series. CAF meant Clerical, Administrative, and Financial. When my father commanded a CCC camp, he was a CAF-7 and his salary was the same as I got as a P-2. Well, in 1950 Congress decided to unify these various career ladders to form the General Schedule or GS series. Suddenly, I was now a GS-12 instead of a P-5. Same salary, though.

By 1950, NRDL had nearly doubled in size of staff. I had some 35 people working for me. Word arrived from Washington that the Lab would be reorganized and upgraded. The Scientific Division would become the Scientific Department. The former branches would become divisions and sections would become branches. Of course, the grade levels went with the titles. In late 1950, my team became the Engineering Applications Branch and I got promoted to GS-13. The Division Heads now were GS-14s and Paul Tompkins became a GS-15. That was as far as the unified career ladders went but Congress had authorized three new levels called "supergrades" and, wonder of wonders, Aitch Sullivan was slated to become a GS-16.

Aitch Gets a Period

Up to that point, Aitch Sullivan had neither helped nor hindered my efforts. It was if he was not there. Apparently, others also wondered what he did with his time. In particular, Captain Bird wondered. I now think Paul Tompkins was brought in specifically as a replacement for Aitch Sullivan. It is difficult, however, to get rid of "deadwood" in the Federal Service. One must document in detail the failure to perform the functions in the position description and then give the employee 30 days to correct the deficiencies. Then there must be a hearing before the firing.

All this was handled quietly. I had no inkling that Aitch was at risk until the "latrine incident" sent ripples through the Scientific Department staff. According to the story that circulated, Captain Bird, Colonel Wolfe, and Paul Tompkins had assembled a catalog of Aitch's deficiencies to be used to fire him. Dick Wolfe was making some last minute emendations to the list when he felt a call of nature. He went to the men's head, as the Navy termed it. To free his hands, he put the damning document on a ledge above the toilet and forgot all about it when he left. As fate would have it, the next person to use the same stall was Aitch Sullivan! He noticed the papers, perused them, and recognizing

them for what they were, carried them off to his office where he began to compose a detailed rebuttal. Dick Wolfe, of course, soon became aware of his oversight and hurried back to the head to find the papers gone. Ultimately, they were traced to Aitch and a tremendous brouhaha ensued. It did Aitch little good. The Navy wrote a period to his career at NRDL and he went back to Oak Ridge where he belonged.

The Breakup

Meanwhile, the reorganization of NRDL continued apace. After being acting head of the Engineering Applications Branch for a number of months, I got my GS-13 in November of 1950. Paul Tompkins was by then Associate Scientific Director. Aitch was playing with the Periodic Table of the Elements. I was head of Engineering Applications less than three months. In January 1951, I became acting head of a new Division of the Scientific Department called the Special Operations Division and the Engineering Applications Branch was disestablished.

What had happened was that my branch had gotten too big and was involved in too many different things. So, Engineering Applications was broken up into three branches. Applied Research Branch and Technical Developments Branch were reassigned to the Chemical Technology Division, which was the new name of the old Chemistry Branch. The third remnant of Engineering Applications was named at my suggestion Military Evaluations Branch. It was the outgrowth of our work on the AFSWP manual *Radiological Defense* and on the AEC manual *Effects of Atomic Weapons.* The Military Evaluations Branch was in the new Special Operations Division, along with a Field Operations Branch and the Health Physics Branch.

I hate to bore you with these niggling bureaucratic details but there is a point to be made. I was now head of Military Evaluations Branch. In addition, I was acting head of the Field Operations Branch, which was formed to direct all NRDL operations at nuclear weapons tests both in Nevada and at Eniwetok. And, as acting head of the new Division, I supervised the Health Physics Branch. Do you realize what that meant? Big Al Baietti now worked for me!

The Concrete Block

A major goodie that came NRDL's way as a part of the Korean War buildup was a new building. Lord knows we needed one. The various parts of the Lab were spread through some dozen buildings left over from World War II. None of them were really suitable for a research facility. My group was located on the upper floor of a three-story concrete and glass building the lower floors of which had been some sort of shops, now abandoned. The head shed issued a map so the nerds could find their way around. Because the shipyard was an industrial area we had to wear hard hats even though all the shipyard stuff was on the north side of Hunters Point and we were off in the nearly empty south side.

Buships had put us into their budget and suddenly we found that $14 million had been appropriated for a building where we could all be together. Soon, an architectural firm that had been hired to finalize the building design showed up to brief the supervisory staff. The building they proposed was the usual government yawner: A three-story building with a long front bay and wings sticking out the back like teeth in a comb so nearly everyone could have a window. At the conclusion of their presentation, Captain Bird invited comments. Before anyone else could speak, I stood and said, “I don’t think this design is at all appropriate for us. We are the Naval Radiological Defense Laboratory. This is the dawn of the Atomic Age. We need to practice what we are preaching. The building should be a windowless structure.”

There was a rumble of comment from the others. I couldn’t tell whether the balance was for or against. The Architect protested bitterly. “That would be just a concrete blockhouse.” He could see an architectural award disappearing. But my fellow NRDLers started to see some advantages. We could have a controlled environment for experiments. Radiological safety would be improved. Security would be simpler. We would save money on heating and cooling. There would be no windows to wash or replace. Others worried about the psychological effects of being cooped up without a view of the outside. I credit Joe Bird with the courage to tell us to go ahead with a preliminary design of the concrete block.

We came up with a simple cube 450 feet along the street, 100 feet deep and six stories high. There was a central entrance area and escalators. The head shed would be on the third floor; shops and administrative offices on the first and second. The Scientific Department would be on the fourth, fifth, and sixth floors. On the roof we proposed a penthouse with windows all around to house the cafeteria. The design met all our requirements. There was just one problem. The architect estimated that the building would cost about $3 million more than the Congress had appropriated. Part of the basis for the estimate was the architect’s belief that a windowless building was so unusual that construction firms would add substantially to their bid to cover their uncertainty. We argued against this assumption in vain. In the end we reduced the size of the building by shortening its length by about 100 feet. The entrance and the penthouse were relocated to center on the shorter building and we went to bid.

The winning bid was about $3 million *less* than the money available. In other words, we could have built our original design and stayed within the appropriation. We took turns excoriating the architect when he wasn’t there. It turned out we couldn’t change the design back to what it was. We had a firm contract for the smaller structure. What we did was let a contract for a second building right up against the first that restored the length to what it was supposed to be. The contractor won the second contract to go with the first. Of course, the entrance, penthouse, and escalators were off center but we couldn’t help that. As built, it was difficult to see the joint between the two buildings unless one knew what to look for.

The NRDL building fulfilled all of our expectations. It was a wonderful place in which to work and the operations and maintenance bills were considerably lower than normal.

There were no adverse psychological effects and the big windowless facade was appropriately symbolic of our mission. Only one scientist refused to move into the new structure. He was a peculiar nerd who had a phobia about doors. In graduate school at the University of California he caused quite a stir by hanging a knotted rope out of his room window in the dorm and shinnying up and down rather than use the doors. Oh well, one can't please everyone.

The concrete block has been vacant since NRDL was disestablished in 1969. I can see it occasionally from the Goodyear blimp during a Forty-Niners football game. But without power or maintenance for twenty-five years, the roof leaks and the halls and rooms are said to be festooned with mildew, lichen and other creatures of the dark. It sits there at Hunters Point abandoned, good for nothing but growing mushrooms.